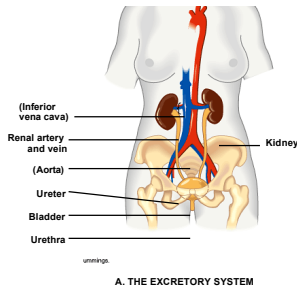


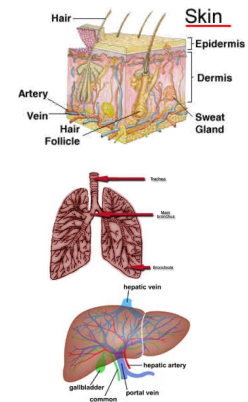
## The excretory system - a major system for maintaining homeostasis

- The excretory system
  - expels wastes
  - regulates water and salt balance



## Organs of Excretion

- **Skin and associated glands:** Removes water and salts
- **Lungs:** Removes carbon dioxide
- **Liver:** Removes metabolic wastes



## Organs of Excretion

- **Kidneys (part of the Urinary system):**
- MAJOR excretory organs that excrete metabolic wastes, regulate water-salt balance and acid-base balance.



## OSMOREGULATION AND EXCRETION

**Osmoregulation:** All animals balance the gain and loss of water and dissolved solutes

- Land animals gain water by drinking and eating
- They lose water and solutes by evaporation and waste disposal
- Their kidneys, behavior, and waterproof skin conserve water

## Connection: Sweating can produce serious water loss

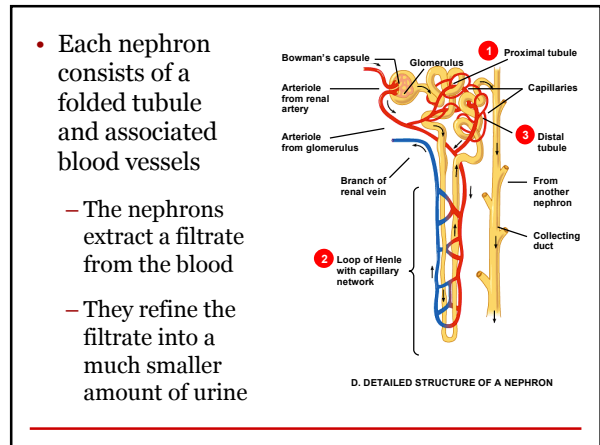
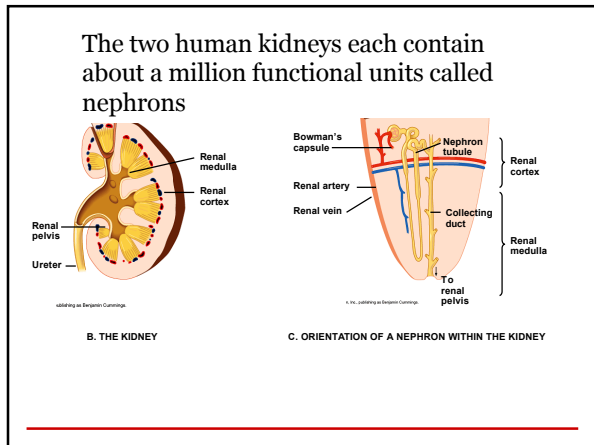
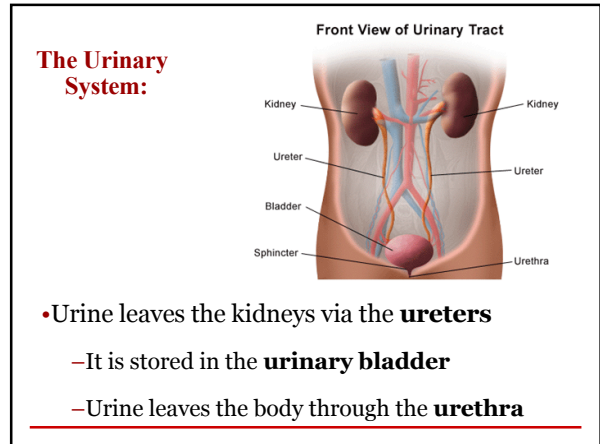
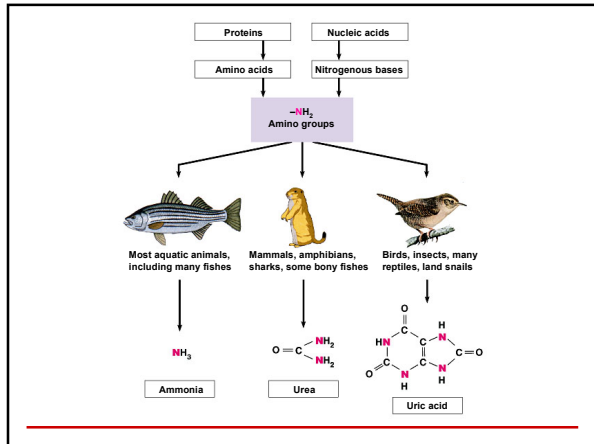
- Water lost in thermoregulation can cause osmoregulatory problems
  - Drinking water is the best way to prevent dehydration during exercise



Figure 25.6

## Animals must dispose of nitrogenous wastes

- Nitrogen-containing wastes are toxic by-products of protein and nucleic acid breakdown
  - Ammonia is poisonous but soluble and easily disposed of
  - Urea is less toxic and easy to store and excrete
  - Some land animals save water by excreting a virtually dry waste



### How the kidney nephron operates

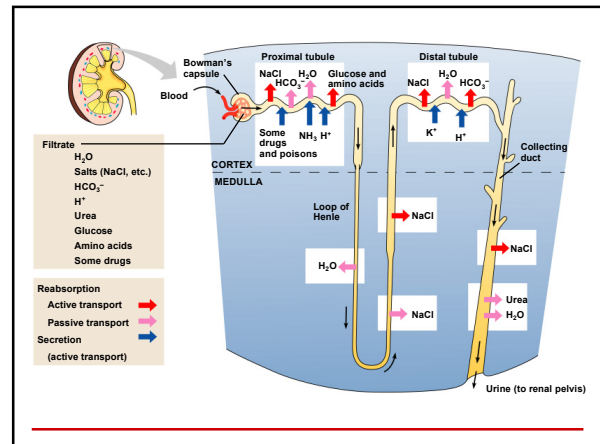
- Filtration - occurs in Bowman's capsule
  - Blood pressure forces water and many solutes from the glomerulus into the nephron
- Reabsorption – occurs in the tubule
  - The nephron tubule reclaims valuable solutes and water
  - Reabsorption of salts and urea promote the osmotic reabsorption of water

- Secretion – occurs in the tubule
  - Additional materials are passed from the blood capillaries into the nephron
  - includes the active transport of large molecules, drugs and poisons

Nephron Animation

## Regulating pH and water

- Controlled secretion/reabsorption of  $H^+$  and bicarbonate ions help regulate blood pH
- Antidiuretic hormone and other hormones regulate the amount of salt and water the kidneys excrete



## Kidney dialysis

- A dialysis machine compensates for kidney failure
  - It performs the function of the nephrons by removing wastes from the blood and maintaining its solute concentration

